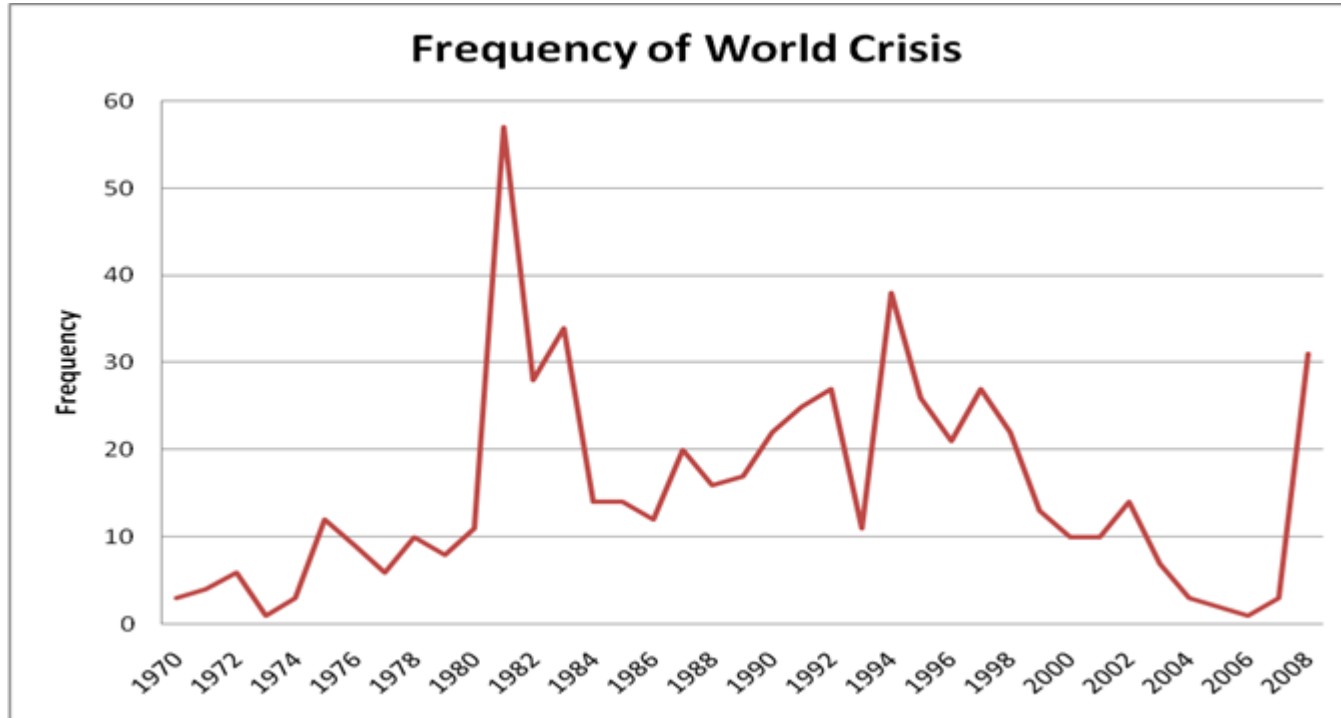
The Determinants of Inflation under Dual Monetary System in Indonesia

Ascarya

Center of Education and Central Banking Studies

Background

- In a country adopting dual monetary system (conventional and Islamic), monetary authority has the responsibility to maintain financial/monetary stability and synergy of both systems by stabilizing price level (i.e., exchange rate and inflation) to optimize the benefit for distributive social welfare.
- Inflation is a subject that is so much discussed, but so little understood (Hazlitt, 1978)
- Most economists agree that the problem of inflation is the greatest problem faced by market economy in the West which has not been resolved yet. When inflation gets out of control, it will trigger financial crisis, since the causes of inflation are also some of the root causes of financial crisis.
- It seems that they have not learned the lessons yet on how to eradicate and/or control the inflation, including Indonesia.

Background

- **Therefore, there should be a study that can determine the real causes of inflation under dual monetary system viewed from conventional and Islamic perspectives, so that proper remedies can be formulated to combat, eradicate, and control inflation.**

Objectives

- To determine the causes of inflation under dual monetary system in Indonesia within conventional and Islamic perspectives.
- To compare the main determinants of inflation in conventional and Islamic perspective to identify the real source of Inflation.
- To formulate systematic steps to eradicate and control inflation.

Methodology

- The methodology applied will be Vector Auto Regression (VAR), followed by Vector Error Correction Model (VECM), if cointegration occurred.

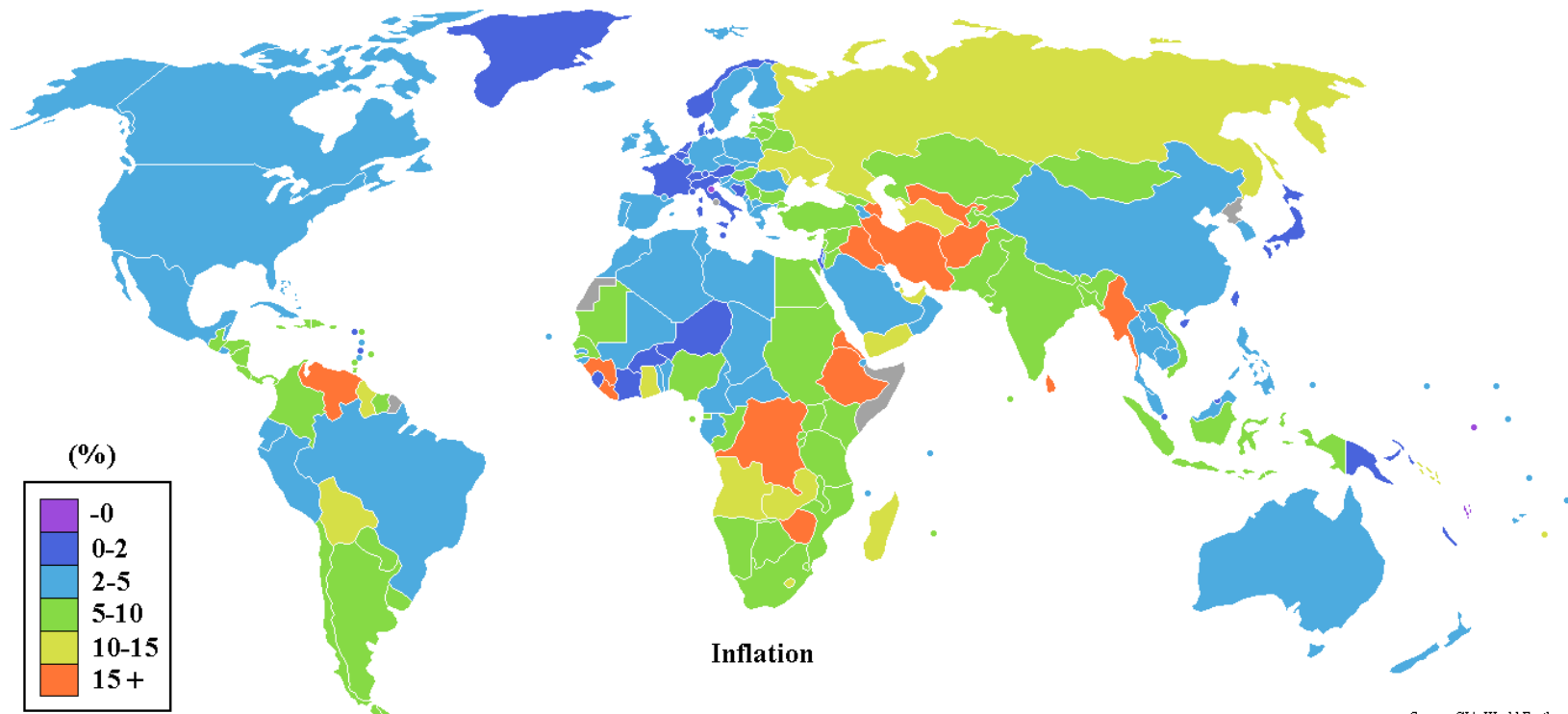
The Origin of Inflation

- Inflation started as a debasement of metallic currency (Roman and Byzantine) since 193 M. It was strictly prohibited since Prophet Muhammad's (SAW) time.
- In the time of Umayyad Caliph Marwan Ibn al-Hakam (684-685 M), he had a man's hand cut off for cutting up a *Dirham* or silver currency.
- In 11TH century, one English Pound comprised 240 silver pennies. By 1666, one English Pound was minted into more than 700 pennies.
- In 14th century, hyper inflation in Egypt happened due to overly minted *Fulus* (copper) currency.
- BoE established in 1694 and issued paper money backed by 100 percent gold or silver. Later on BoE issued paper money on certain reserve ratio. This leaded to the first two crises of the century in 1825 M and 1837 M which were due to over issue of bank notes.

The Origin of Inflation

- Under Utsmaniah Empire in 1839 M, paper money "al-Qa'imah" was issued, but was suspended in 1862 M due to too much al-Qa'imah in circulation.
- In 1934, the US Dollar was devalued from 23.22 grains of gold to 13.714 grains of gold by order of President Roosevelt.
- **David Hume** (1711-1776) proposed '**beneficial inflation**' that would raise production in the short run. But, **John Maynard Keynes** (in 1936) was '**the intellectual actor**' who successfully model Hume's idea. His '**inflation economics**' (named and criticized by Austrian school) has been adopted by most government in the world.
- "By this means (*seigniorage*) government may secretly and unobserved, confiscate the wealth of the people, and not one man in a million will detect the theft" (John Maynard Keynes)
- Inflation is a deliberate ideological and political choice of 'economic regime' adopted by the government to profit from *seigniorage* income.

Inflation

- Inflation is the rate of increase of the general price level of all goods and services. Inflation is an increase in the money supply (monetary inflation). Inflation is a decline in the real value or purchasing power of money as a medium of exchange or a monetary unit of account.

Inflation under Conventional Perspective

- **KEYNESIAN – Inflation is an increase in the general level of prices → PRICE INFLATION. Three main sources of inflation are demand-pull inflation, cost-push inflation, and built-in inflation (adaptive expectation).**
- **CLASSIC/MONETARIST – Inflation is always a monetary phenomenon, i.e., increases in the money supply → MONETARY INFLATION. The quantity theory of money, M*V=P*Q.**
- **RATIONAL EXPECTATIONS – Grounded in monetarism. Economic actors look rationally (not adaptive or backward looking, but forward looking) into the future.**
- **AUSTRIAN – Inflation IS an increase in the money supply, magnified by credit expansion. Solution – replace fiat money with gold standard and replace fractional reserve banking with free banking.**

Inflation under Islamic Perspective

- ABU YUSUF (113-182 H) – Inflation is a price increase due to excess money in circulation (→ monetary inflation).
- AL-GHAZALI (450-505 H) – Inflation is a price increase due to excessive demand (→ demand-pull inflation)
- IBN TAIMIYAH (661-728 H/1263-1328 M) – Inflation is a price increase due to reduction in production or import (→ cost-push inflation).
- IBN KHALDUN (732-808 H/1332-1404 M) – Inflation is an increase in general price due to scarcity (cost-push) or excess demand (demand-pull).
- AL-MAQRIZI (766-845 H/1364-1442 M) – Inflation is a natural phenomenon, where general prices are continuously increasing. Sources – natural inflation and human error inflation (corruption, poor administration, and the increase of fulus money in circulation).

Inflation under Islamic Perspective

- **MONZER KAHF – Inflation is a general price increase due to excess money supply from fiat money (money creation) and bank money (credit creation and interest).**
- **UMER CHAPRA - Inflation is the erosion of the purchasing power of monetary assets because money is unable to serve as: 1) a just and honest unit of account, 2) an equitable standard of deferred payment, and 3) a trustworthy store of value. Source: money creation, credit creation, interest, speculation.**
- **HIFZUR RAB – Inflation is a consistent and appreciable increase in prices due to natural causes (technical change, natural disaster) and artificial causes (hoarding, fraud, deception, price manipulation → criminal activities). Producing currency beyond the real needs of the economy = fraud.**
- **A.K. MYDIN MEERA – Inflation is a general price increase due to money / credit creation, such as fiat money, fractional reserve banking, interest, as well as credit card .**

Impact of Inflation - Islamic Perspective 1

1. Power Holder / Bureaucrat – Highest income → Drop in purchasing power, insignificant impact.
2. Conglomerate / The Haves – High income → Drop in asset, little impact.
3. Middle Entrepreneur / Professional – Middle-high income → Almost no impact.
4. Middle-high Farmer – Farm owner → Increase in asset.

   Low-middle Farmer – Farm worker → Highly impacted and suffered.
5. Fakir (fuqaha, teacher, student, soldier) – Fixed income → Most impacted and suffered.
6. Blue collar, Servant – Lowest income → Starve to death.
7. Miskin (unfortunate, beggar) – Lowest income → Starve to death.

Impact of Inflation - Islamic Perspective 2

- Impair the efficiency of the monetary system;
- Impose a welfare cost on society, retard economic development;
- Worsen the climate of uncertainty;
- Discourage capital formation and lead to a misallocation of resources;
- Tend to pervert values;
- Reward speculation at the expense of productive activity;
- Intensify inequalities of income and wealth;
- Do injustice and exploitation, the rich exploits the poor;
- Enable unfairness;
- Promote greed and selfishness;
- Distort the pattern of output;
- Undermine efficiency and productive investment; and
- Contribute to social inequity and tension.

The Models of Inflation Determinants

- **Demand-Side Model**

  $\Delta p_t = f(y_t, r_t, r_t^*, e_t^e, m_t^s)$

  y = domestic income level; r = domestic interest rate; r* = foreign interest rate; e^e = expected depreciation; m^s = domestic money supply

- **Supply-Side Model**

  $P_t = \mu_t (ULC_t)^\gamma (E_t P_t^m)^\delta (P_t^o)^K$

  P = CPI; ULC = unit labor cost; P^m = foreign price level; P^o = domestic gas price; EP^m = imported goods price.

- **Mixed Model**

  $$\Delta p_t = \gamma_1(L)\Delta p_{t-1} + \gamma_2(L)\hat{y}_t + \gamma_3(L)\hat{\Phi}_t + \sum_i \gamma_{it}(L) z_{it} + \beta_1(L)\varepsilon_t^w + \varepsilon^p{}_t$$

  Δp_{t-1} = expected inflation; $\hat{y}_t$ = output gap; $\hat{\Phi}_t$ = productivity gap; z = supply shock

The Determinants of Inflation

Cause		Keynesian	Monetarist	Rational Expectation	Austrian	Islamic	
						Classic	Contemporary
Human Error / Artificial Inflation	**DEMAND**						
	Corruption					☹	☹
	Behavior						☹
	Excess Money Supply from Money Creation	☹	☹☹	☹	**VV**	**VV**	**VV**
	- Debasement of Dinar					☹	
	- Excess Fulus Money					☹	
	- Fiat Money				☹☹		☹☹
	Excess Money Supply from Credit Creation	☹	☹☹	☹	**VV**		**VV**
	- Fractional Reserve Bk				☹☹		☹☹
	- Credit Card						☹
	- Derivatives						☹
	Interest						☹☹
	Output Gap	☹				☹	☹
	Poor Administration					☹	☹
	Excessive Tax					☹	☹

The Determinants of Inflation

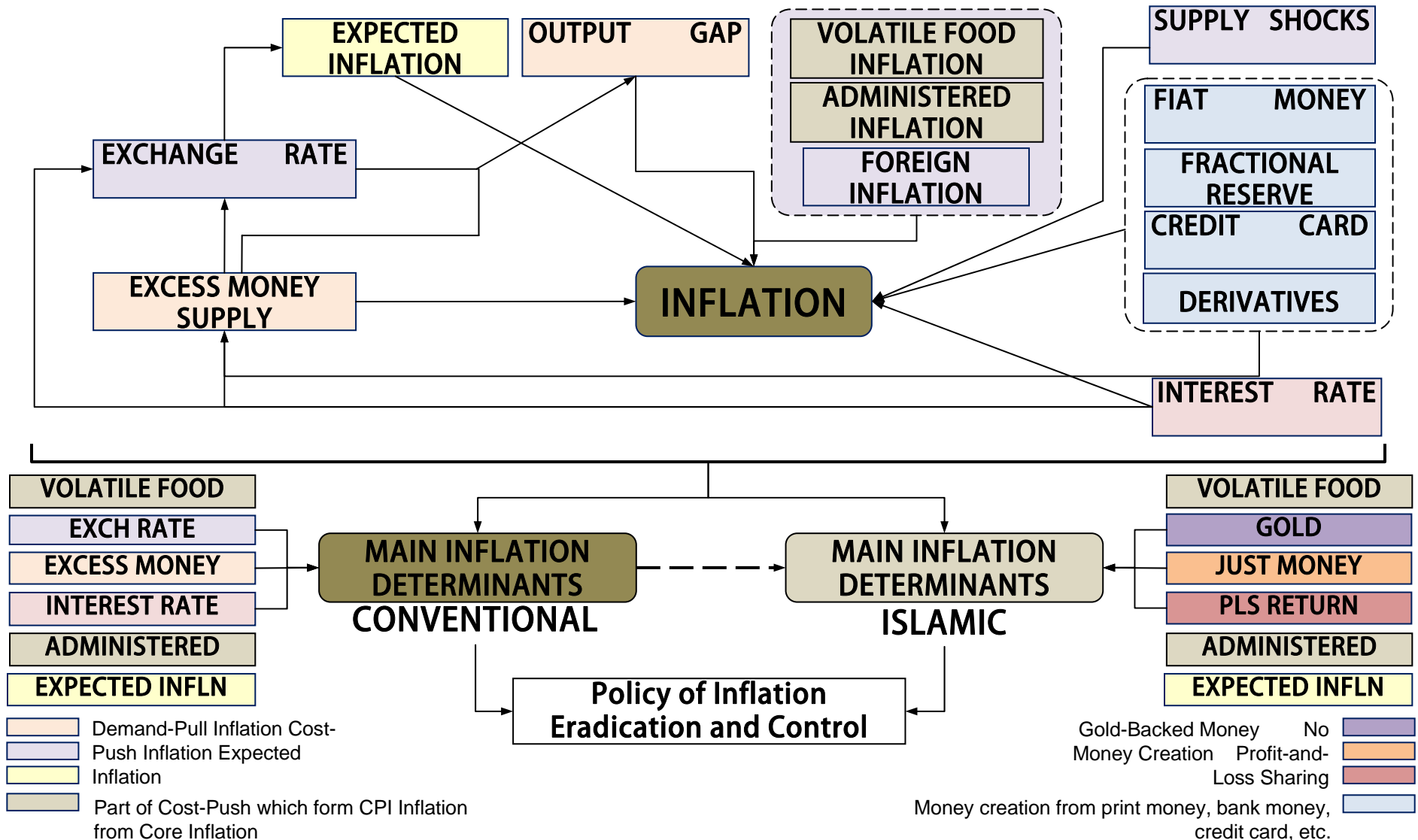
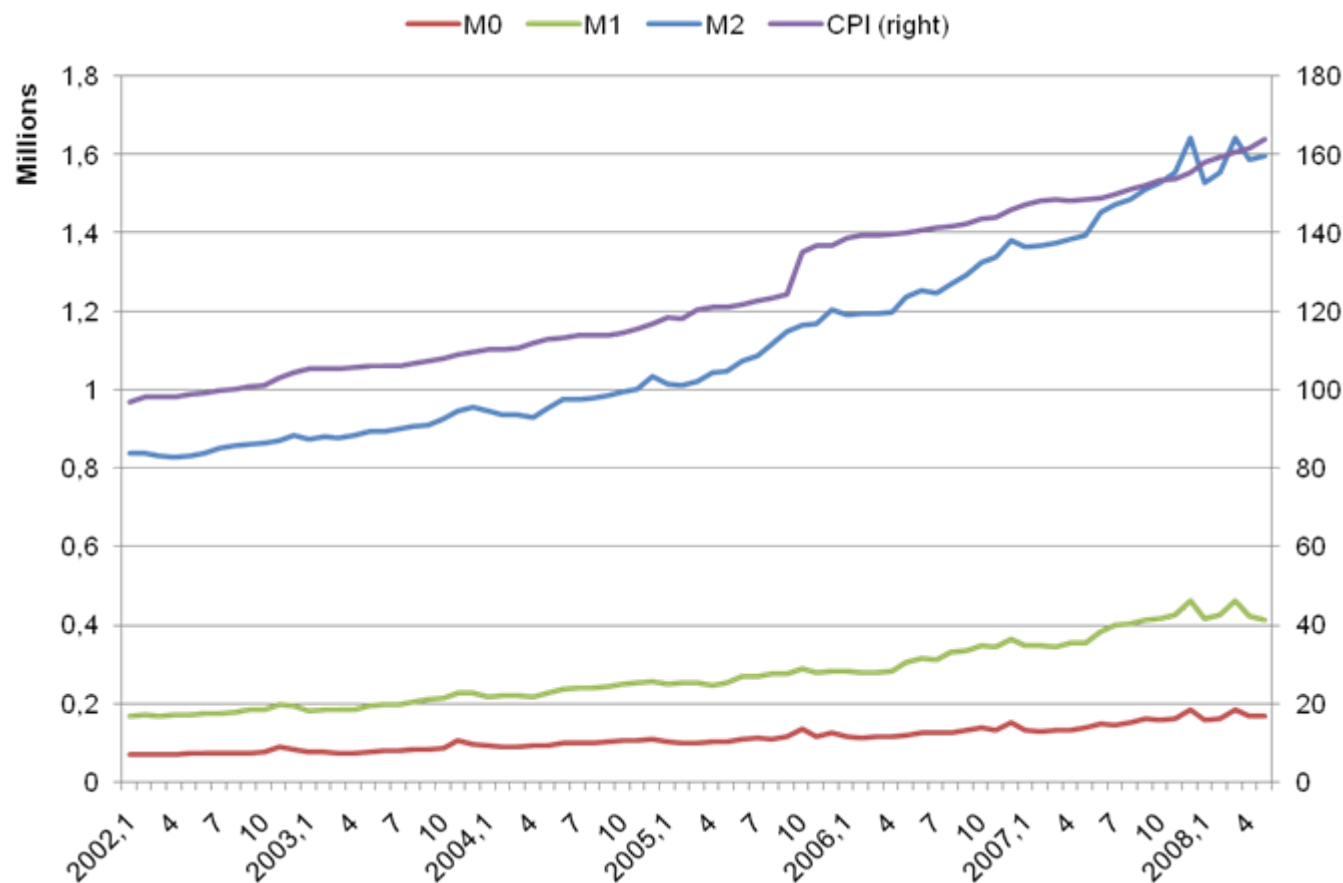
Cause		Keynesian	Monetarist	Rational Expectation	Austrian	Islamic	
						Classic	Contemporary
Human Error / Artificial Inflation	**EXPECTATION**						
	Adaptive	☹					
	Forward			☹☹			
	COST						
	Foreign Inflation	☹	☹	☹	☹	☹	☹
	Exchange Rate	☹			☹		☹
	Volatile Food	☹					
	Administered Price	☹					
	Wages	☹	☹	☹			
Natural Inflation	Supply Shock	☹				☹	☹
	Natural Disaster	☹				☹	☹

Inflation in Various Countries

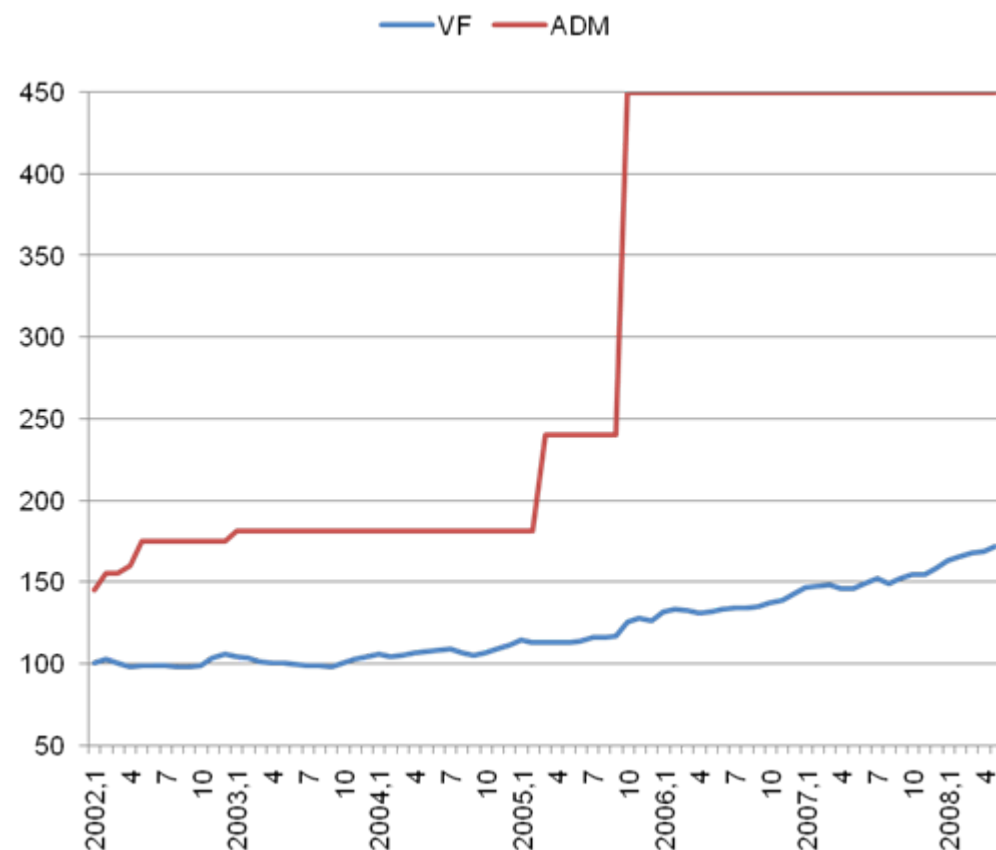
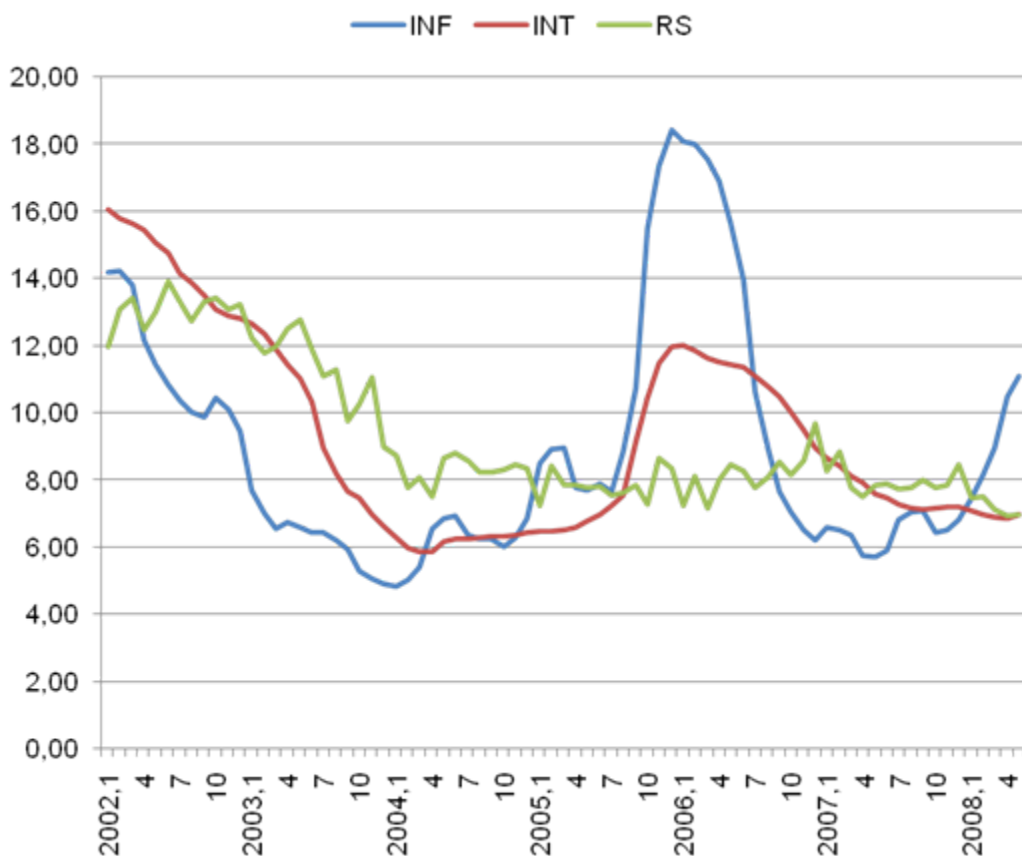
Country	Demand		Supply				Expectation
	Output Gap	Excess Money	Exchange Rate	Foreign Inflation	Energy Price	Food Price	Expected Inflation
Developed							
Germany	V	V				Unit Labor Cost	
UK							
US	V	Money Growth					V
China	V			World Price		Wage/Labor Productivity	
ME-NA							
Egypt							
Saudi Arabia		M Supply Shock		Tr Partner Inflation			
Kuwait		M Supply Shock		Tr Partner Inflation			

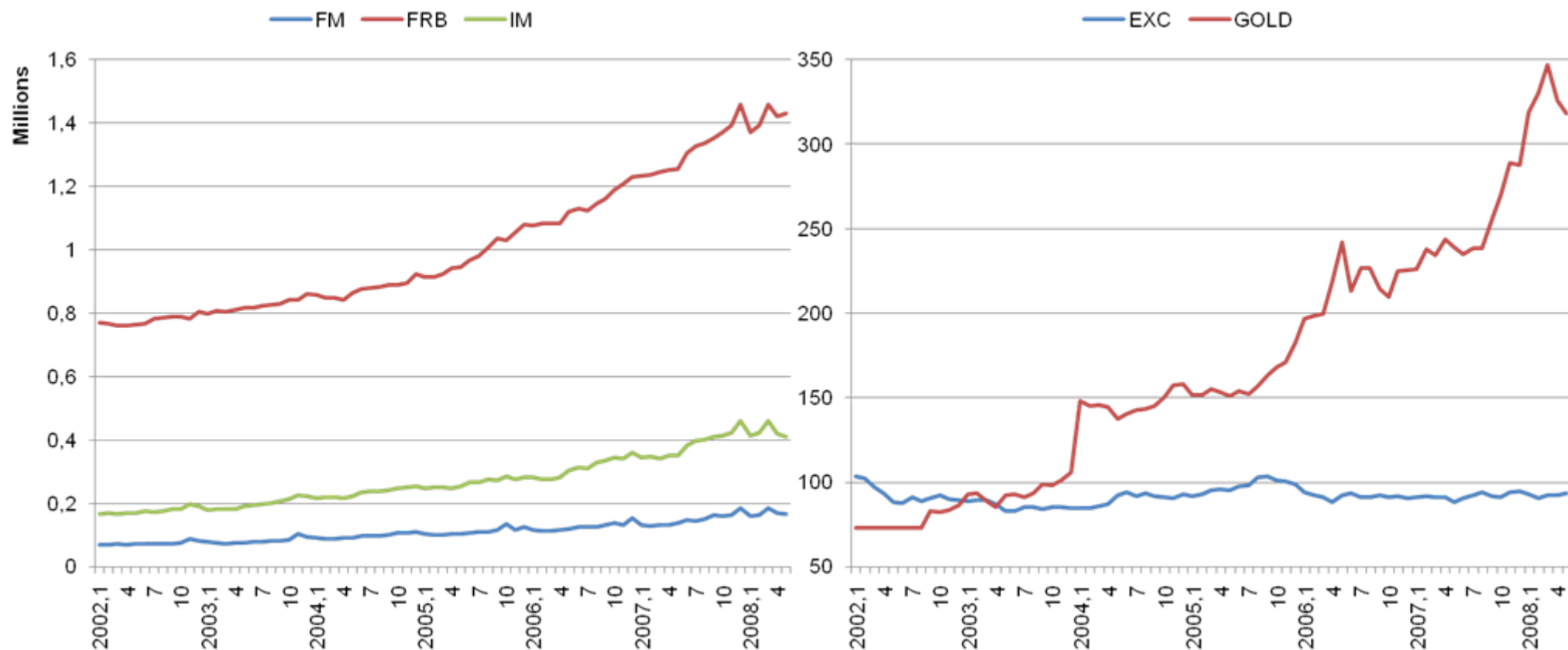
Inflation in Various Countries

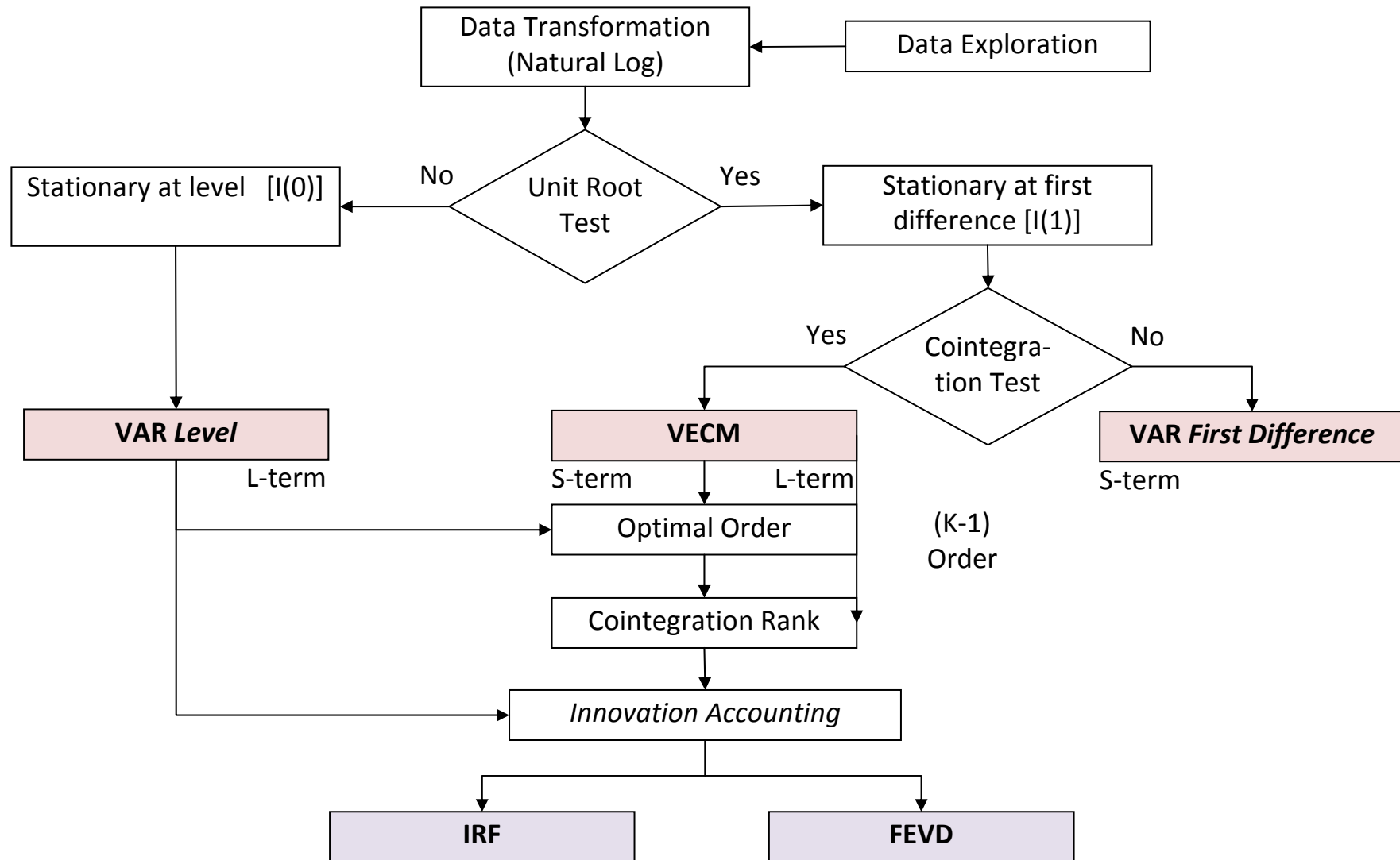
Country	Demand		Supply				Expectation
	Output Gap	Excess Money	Exchange Rate	Foreign Inflation	Energy Price	Food Price	Expected Inflation
Developing							
Brazil							
Thailand		M2			Retail Gas Price	Price of Rice	CPI(-1)
Philippines		M1-RCons	Nominal ER to US$		Retail Gas Price	Food Price Composite	CPI(-1)
Sudan		V	V				
Iran							
Malaysia		M2-Cons	Nominal ER to US$		Brent Oil Price	Price of Rice	CPI(-1)
Pakistan		Brd Money &PS Credit Growth				Wheat support price	
Indonesia		M1-RCons M2-RCons	Nominal ER to US$		Retail Gas Price	Price of Rice	CPI(-1)

Conceptual Framework

CPI and Money Supply

- From 2002:1 to 2008:5, **CPI** inflation has increase 1.7 times, **M0** 2.4 times, **M1** 2.5 times, and **M2** 1.9 times. Money multiplier has decreased from 12.1 to 9.6.

Data

INF, INT, RS, VF, ADM

- INT interest rate, and RS PLS return moved in line with INF inflation, PLS was more stable than INT. VF volatile food has moved in line with CPI inflation, while ADM administered price has gone up more than threefold.

FM, FRB, IM, EXC, GOLD

- FM fiat money has increased 2.4 times, IM just money supply has increased 2.5 times, while FRB fractional reserve banking has increased 1.9 times. EXC exchange rate has been stable and GOLD single global currency has increase 4.3 times.

The Process of VAR Analysis

The Process of VAR Analysis

❑ Conventional CPI Inflation

$$\ln INF_t = \alpha_0 + \alpha_1 \ln FM_t + \alpha_2 \ln FRB_t + \alpha_3 INT_t + \alpha_4 \ln EXC_t$$
$$\cdots\cdots\cdots + \alpha_5 \ln VF_t + \alpha_6 \ln ADM_t + \alpha_7 XINF_t + \varepsilon_t$$

❑ Islamic CPI Inflation

$$\ln INF_t = \beta_0 + \beta_1 \ln IM_t + \beta_2 RS_t + \beta_3 \ln GOLD_t + \beta_4 \ln VF_t$$
$$\cdots\cdots\cdots + \beta_5 \ln ADM_t + \beta_6 XINF_t + \mu_t$$

The Process of VAR Analysis

❑ VAR model in matrix for Conventional CPI Inflation

$$\begin{bmatrix} \ln INF_t \\ \ln FM_t \\ \ln FRB_t \\ INT_t \\ \ln EXC_t \\ \ln VF_t \\ \ln ADM_{t-1} \\ XINF_t \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \\ \alpha_{30} \\ \alpha_{40} \\ \alpha_{50} \\ \alpha_{60} \\ \alpha_{70} \\ \alpha_{80} \end{bmatrix} + \begin{bmatrix} \alpha_{11}\alpha_{12}\alpha_{13}\alpha_{14}\alpha_{15}\alpha_{16}\alpha_{17}\alpha_{18} \\ \alpha_{21}\alpha_{22}\alpha_{23}\alpha_{24}\alpha_{25}\alpha_{26}\alpha_{27}\alpha_{28} \\ \alpha_{31}\alpha_{32}\alpha_{33}\alpha_{34}\alpha_{35}\alpha_{36}\alpha_{37}\alpha_{38} \\ \alpha_{41}\alpha_{42}\alpha_{43}\alpha_{44}\alpha_{45}\alpha_{46}\alpha_{47}\alpha_{48} \\ \alpha_{51}\alpha_{52}\alpha_{53}\alpha_{54}\alpha_{55}\alpha_{56}\alpha_{57}\alpha_{58} \\ \alpha_{61}\alpha_{62}\alpha_{63}\alpha_{64}\alpha_{65}\alpha_{66}\alpha_{67}\alpha_{68} \\ \alpha_{71}\alpha_{72}\alpha_{73}\alpha_{74}\alpha_{75}\alpha_{76}\alpha_{77}\alpha_{78} \\ \alpha_{81}\alpha_{82}\alpha_{83}\alpha_{84}\alpha_{85}\alpha_{86}\alpha_{87}\alpha_{88} \end{bmatrix} \begin{bmatrix} \ln INF_{t-1} \\ \ln FM_{t-1} \\ \ln FRB_{t-1} \\ INT_{t-1} \\ \ln EXC_{t-1} \\ \ln VF_{t-1} \\ \ln ADM_{t-1} \\ XINF_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix}$$

↓ ***Variable*** ↓ ***Constant*** ↓ ***Parameter*** ↓ ***Lag*** ↓ ***Error***

The Process of VAR Analysis

❑ VAR model in matrix for Islamic CPI Inflation

$$\begin{bmatrix} \ln INF_t \\ \ln IM_t \\ RS_t \\ \ln GOLD_t \\ \ln VF_t \\ \ln ADM_t \\ XINF_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \\ \beta_{70} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} & \beta_{27} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} & \beta_{47} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} & \beta_{57} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} & \beta_{67} \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & \beta_{75} & \beta_{76} & \beta_{77} \end{bmatrix} \begin{bmatrix} \ln INF_{t-1} \\ \ln IM_{t-1} \\ RS_{t-1} \\ \ln GOLD_{t-1} \\ \ln VF_{t-1} \\ \ln ADM_{t-1} \\ XINF_{t-1} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \end{bmatrix}$$

Methodology

The Process of VAR Analysis

❑ VECM model in matrix for Conventional CPI Inflation

$$
\begin{bmatrix} \Delta \ln INF_t \\ \Delta \ln FM_t \\ \Delta \ln FRB_t \\ \Delta INT_t \\ \Delta \ln EXC_t \\ \Delta \ln VF_t \\ \Delta \ln ADM_t \\ \Delta XINF_t \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \\ \alpha_{30} \\ \alpha_{40} \\ \alpha_{50} \\ \alpha_{60} \\ \alpha_{70} \\ \alpha_{80} \end{bmatrix} + \begin{bmatrix} \alpha_{11}\alpha_{12}\alpha_{13}\alpha_{14}\alpha_{15}\alpha_{16}\alpha_{17}\alpha_{18} \\ \alpha_{21}\alpha_{22}\alpha_{23}\alpha_{24}\alpha_{25}\alpha_{26}\alpha_{27}\alpha_{28} \\ \alpha_{31}\alpha_{32}\alpha_{33}\alpha_{34}\alpha_{35}\alpha_{36}\alpha_{37}\alpha_{38} \\ \alpha_{41}\alpha_{42}\alpha_{43}\alpha_{44}\alpha_{45}\alpha_{46}\alpha_{47}\alpha_{48} \\ \alpha_{51}\alpha_{52}\alpha_{53}\alpha_{54}\alpha_{55}\alpha_{56}\alpha_{57}\alpha_{58} \\ \alpha_{61}\alpha_{62}\alpha_{63}\alpha_{64}\alpha_{65}\alpha_{66}\alpha_{67}\alpha_{68} \\ \alpha_{71}\alpha_{72}\alpha_{73}\alpha_{74}\alpha_{75}\alpha_{76}\alpha_{77}\alpha_{78} \\ \alpha_{81}\alpha_{82}\alpha_{83}\alpha_{84}\alpha_{85}\alpha_{86}\alpha_{87}\alpha_{88} \end{bmatrix} \begin{bmatrix} \Delta \ln INF_{t-1} \\ \Delta \ln FM_{t-1} \\ \Delta \ln FRB_{t-1} \\ \Delta INT_{t-1} \\ \Delta \ln EXC_{t-1} \\ \Delta \ln VF_{t-1} \\ \Delta \ln ADM_{t-1} \\ \Delta XINF_{t-1} \end{bmatrix} - \lambda \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix}
$$

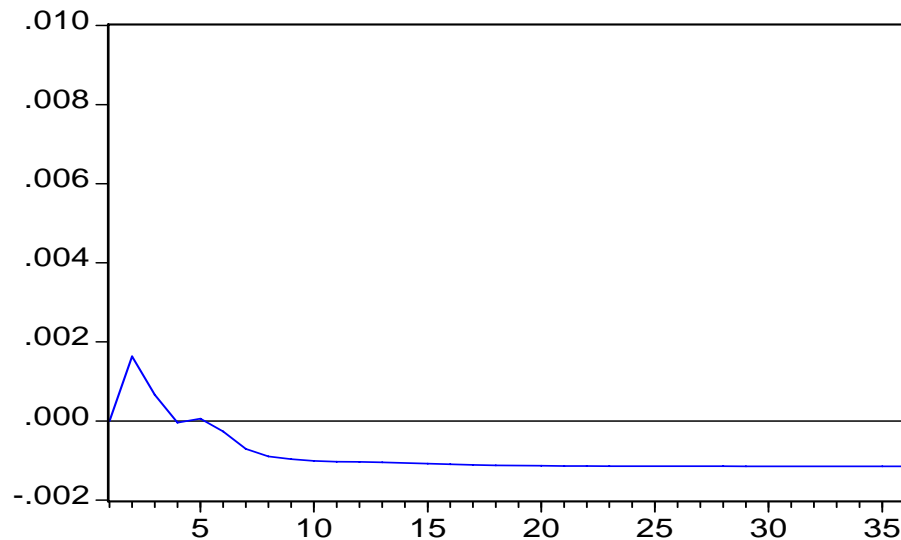
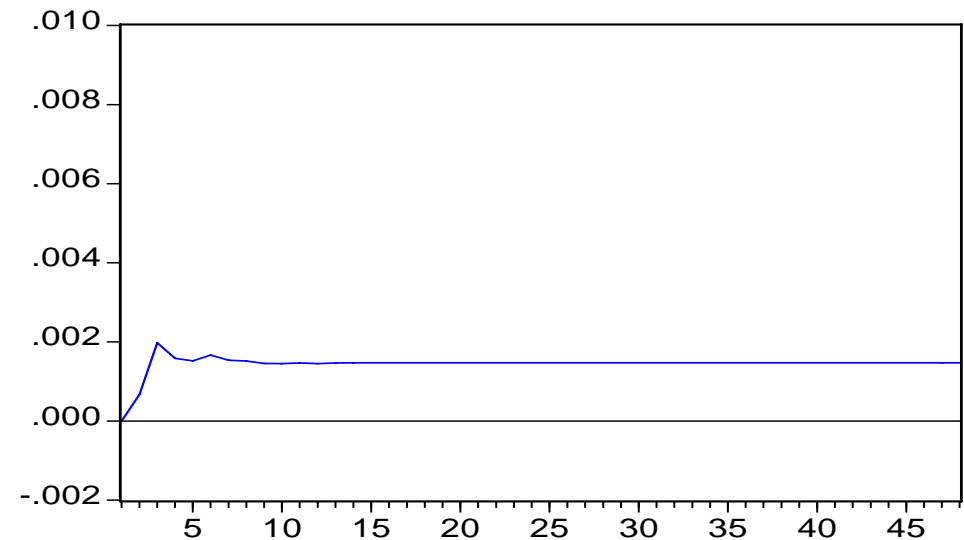
↓ ***Varible*** ↓ ***Constant*** ↓ ***Parameter*** ↓ ***Lag*** ↓ ***Error***

The Process of VAR Analysis

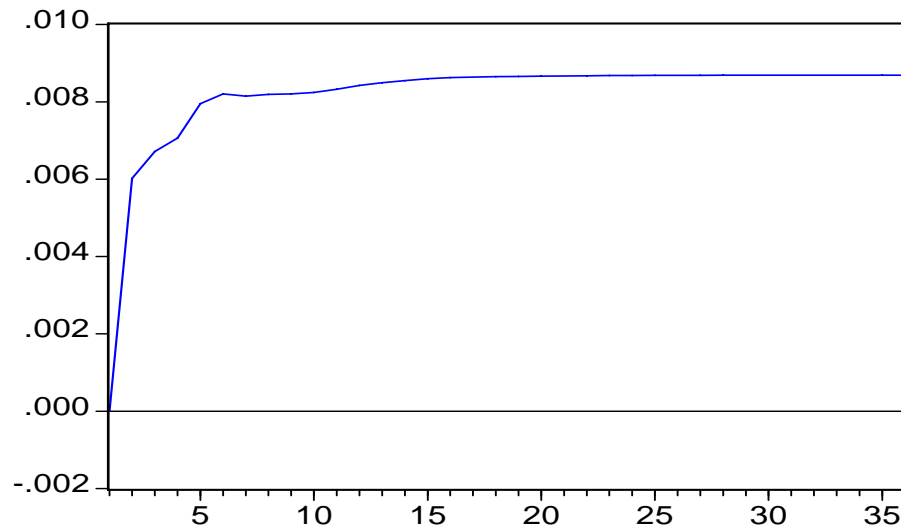
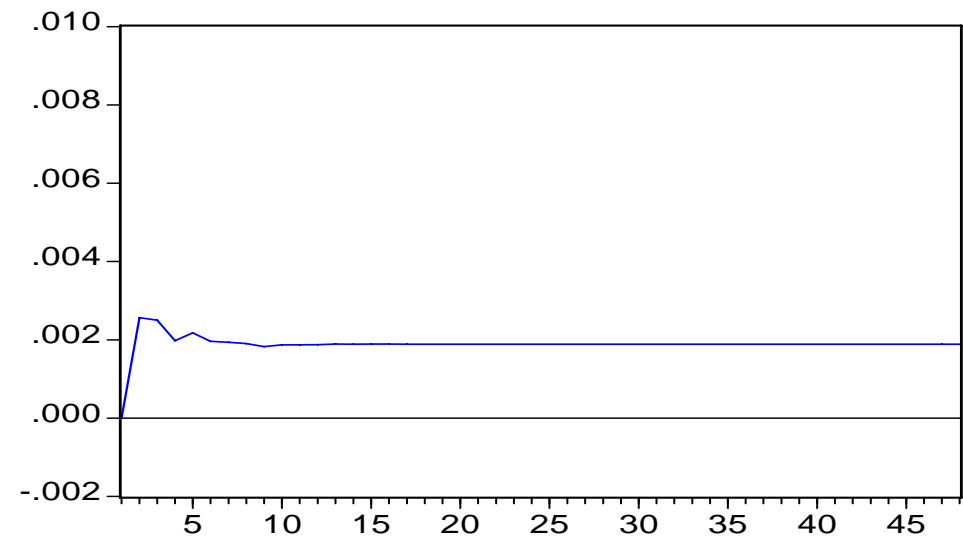
❑ VECM model in matrix for Islamic CPI Inflation

$$
\begin{bmatrix} \Delta \ln INF_t \\ \Delta \ln IM_t \\ \Delta RS_t \\ \Delta \ln GOLD_t \\ \Delta \ln VF_t \\ \Delta \ln ADM_t \\ \Delta XINF_t \end{bmatrix}
=
\begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \\ \beta_{70} \end{bmatrix}
+
\begin{bmatrix}
\beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} \\
\beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} & \beta_{27} \\
\beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\
\beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} & \beta_{47} \\
\beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} & \beta_{57} \\
\beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} & \beta_{67} \\
\beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & \beta_{75} & \beta_{76} & \beta_{77}
\end{bmatrix}
\begin{bmatrix} \Delta \ln INF_{t-1} \\ \Delta \ln IM_{t-1} \\ \Delta RS_{t-1} \\ \Delta \ln GOLD_{t-1} \\ \Delta \ln VF_{t-1} \\ \Delta \ln ADM_{t-1} \\ \Delta XINF_{t-1} \end{bmatrix}
- \lambda
\begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \end{bmatrix}
$$

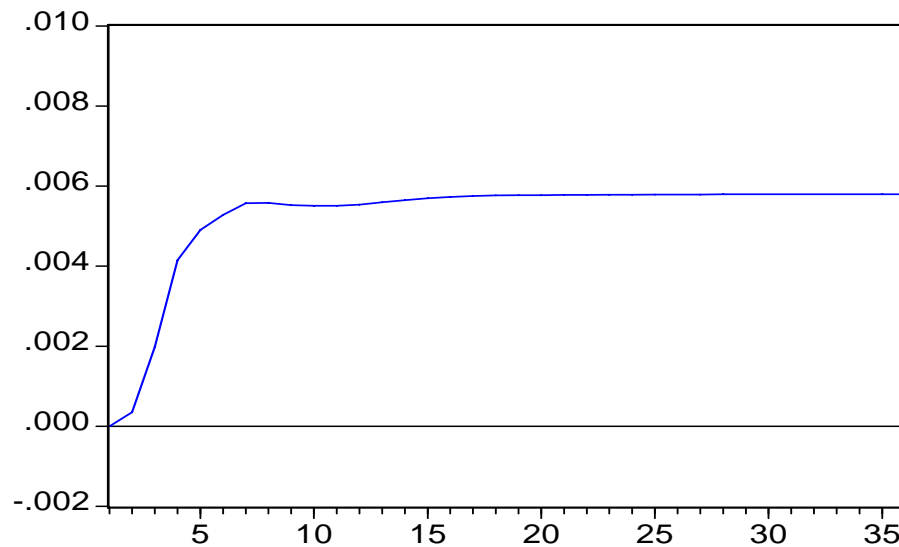
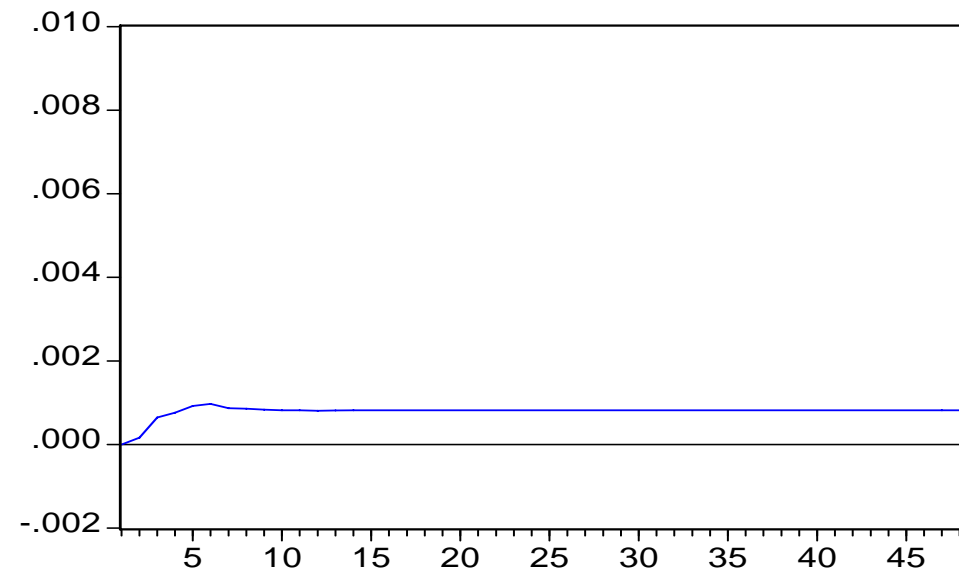
Impulse Response Function

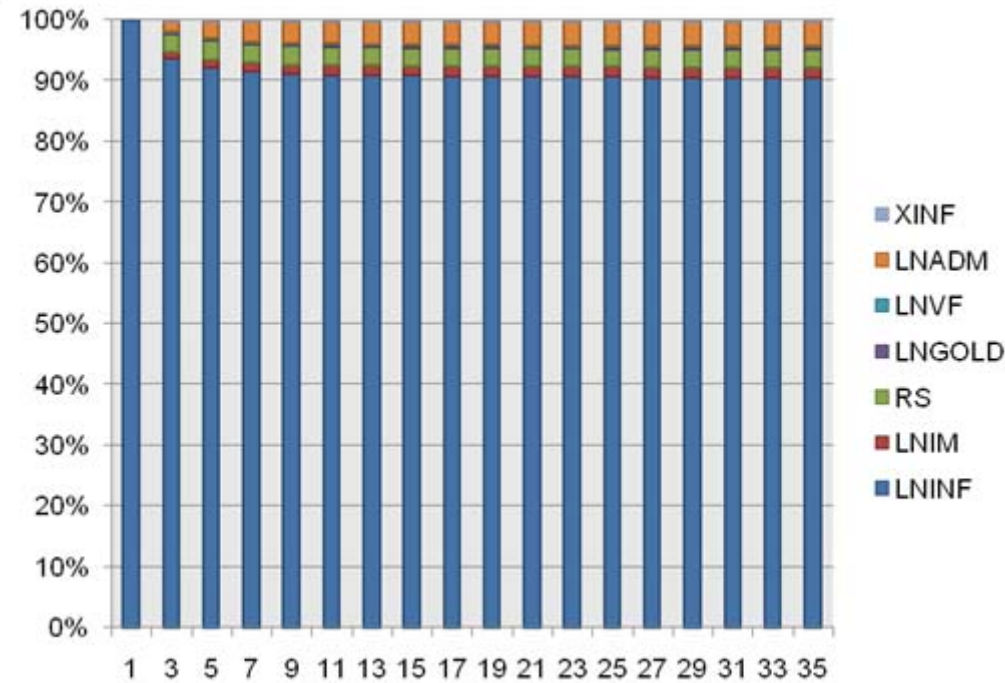
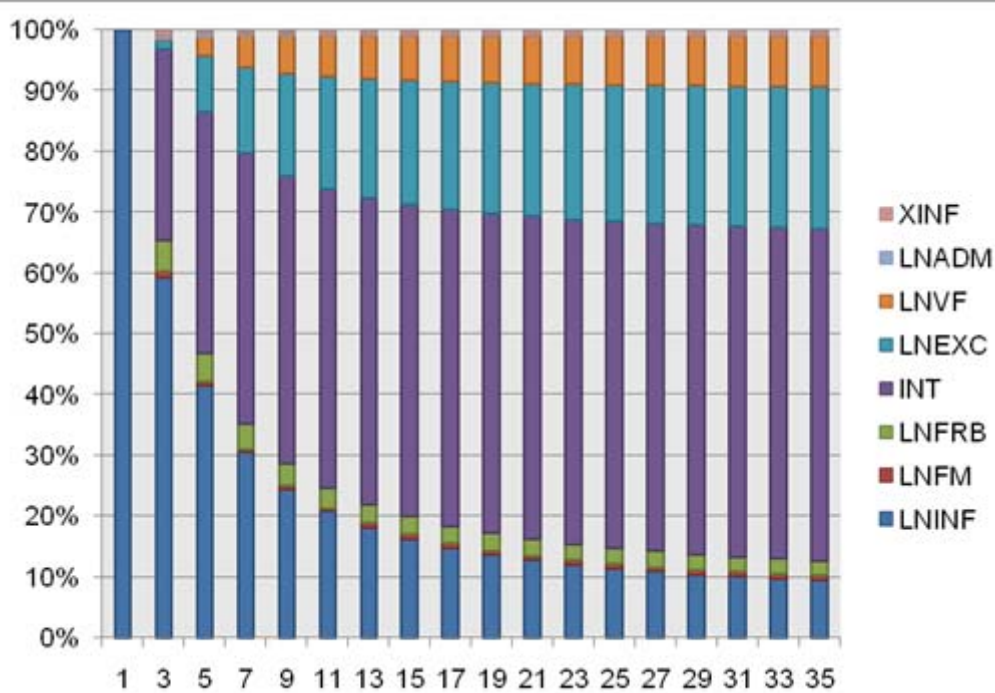
- **Response of CPI Inflation to Fiat Money lnFM and Just Money lnIM**

- **Just money supply lnIM gives greater and permanent positive impact (but not significant) than that of lnFM (but significant in long-term) to CPI inflation. Possible problem: Improper proxy of token M0 for lnFM and the proxy of M1 for lnIM, so that the essence difference of these two variables cannot be captured.**

Impulse Response Function

- **Response of CPI Inflation to Interest Rate INT and PLS Returns RS**

- **Interest rate INT gives much greater and permanent impact (and significant in short-term) than that of PLS returns RS (and not significant) to CPI inflation.**

Impulse Response Function

- **Response of CPI Inflation to Multiple Currency lnEXC and Single Currency lnGOLD**

- **Multiple currency system lnEXC gives much greater and permanent impact (and significant in long-term) than that of Single global currency lnGOLD (and not significant) to CPI inflation.**

Forecast Error Variance Decomposition

- Main source of inflation under conventional perspective (lnFM fiat money 0.9% , lnFRB fractional reserve banking 2.4% , INT interest rate 54.7%, and lnEXC exchange rate 23.4%) give 81.4% share to inflation in Indonesia, while if we replace these three systems according to Islamic perspective (lnIM just money supply 1.7%, RS PLS return 2.9%, and lnGOLD single global currency 0.5%) will give only 5.1% share to inflation in Indonesia.

Descriptive Analysis

- The problem of inflation first emerged as a debasement of gold and silver currencies which is essentially a transgression of Allah's law and natural balance. Gold as currency was originally a public goods which now can be owned privately, so that piling and hoarding gold become legal, which were previously prohibited.
- Today's transgressions are expanded and amplified by the institution of *riba* (many forms of money creation and credit creation), *gharar* (unclear transactions), and *mysir* (speculation and gambling). Transgression will result in catastrophe and natural imbalance.
- Inflation is recognized by Austrian school as ideological and political diseases, where the government deliberately runs inflation economics. Therefore, to combat inflation is just a matter of political will and commitment. Austrian school offers two choices, inflation or gold standard (i.e., replace fiat money with gold standard and fractional reserve banking with free banking).

Descriptive Analysis

- Most determinants of inflation have been recognized by conventional as well as Islamic perspective. However, Islamic perspective has gone further into the detail and some more (such as, interest, credit card, derivatives, corruption, and poor administration).
- Massive efforts have been made to eradicate inflation and achieve price stability with more failures than success due to the failure to distinguish natural and artificial (human error, criminal activities) causes of inflation.
- We should understand natural causes, but natural causes should not be used as an excuse/smoke screen to allow artificial causes (criminal activities) to continue. Artificial causes of inflation can be eradicated.
- In the end, inflation is an ideological and political choice of economic regime taken by the government. With the political will and commitment by the government, inflation can be gradually and systematically eradicated and controlled.

Empirical Analysis

- **INT interest rate is the most dominant source of inflation 54.7% and lnEXC exchange rate is the second most dominant source of inflation 23.4%.**
- **The replacement of INT interest rate with RS PLS return alone will reduce 51.8% share of inflation in Indonesia. The further replacement of lnEXC exchange rate with lnGOLD single global currency will reduce further 22.9% share of inflation in Indonesia.**
- **This study can not show sufficient empirical evidence that excess money supply from fiat money and fractional reserve banking is one of the main inflation determinants, although other study by Yuniarti and Hutabarat (2006) proved otherwise. Moreover, history of the debasement of money (i.e., hyperinflation in 14th century Egypt and the first two crises in 19th century England) also showed empirical evidences. There should be a further investigation on this.**

Empirical Analysis

- The 5.1% figure (share of inflation in Islamic perspective lnIM, RS, and lnGOLD) can still be improved further by refining the proxy of just money supply lnIM that use M1, which can not capture the essence of intrinsic M0.
- The sources of inflation from the supply side (volatile foods lnVF and administered prices lnADM) can be solved with the establishment of *hisbah* institution and let the market determine equilibrium prices.

Strategy to Eradicate & Control Inflation

1. EXCESS MONEY SUPPLY

- Fiat Money → Gold Standard

  Stage 1: M2 → M1 → token M0, through 100% reserve banking.

  Stage 2: token M0 → intrinsic M0, through gold accumulation.

Possibility: Long term: YES / NO; Medium term: NO; Short term: NO

- Fractional Reserve Banking → Narrow Banking or Free Banking

Possibility: Long term: YES; Medium term: YES / NO; Short term: NO

- Credit Card → Debit Card

Possibility: Long term: YES; Medium term: YES; Short term: YES / NO

- Derivatives → ABS or Sukuk

Possibility: Long term: YES; Medium term: YES; Short term: YES / NO

Strategy to Eradicate & Control Inflation

Analysis

2. INTEREST → PLS

- Increase the share of Islamic Finance

Possibility: Long term: YES; Medium term: YES; Short term: YES

- Monetary Instrument

Possibility: Long term: YES; Medium term: YES; Short term: NO

3. SPECULATION

- Prohibition or restriction in all markets

Possibility: Long term: YES; Medium term: YES; Short term: YES / NO

4. INTERNATIONAL MONETARY SYSTEM

- Regional (East Asia 14 or OIC 57) Union → Regional Currency → Single Global Currency . East Asia = ASEAN, China, Japan, Korea, India, Australia and New Zealand = 21%, EU = 22.3%, North America = 30% of world GDP.

Possibility: Long term: YES / NO; Medium term: NO; Short term: NO

Strategy to Eradicate & Control Inflation

5. MARKET SYSTEM

- Establish *Hisbah* Institution in every market to regulate, control, and supervise the market from all kinds of activities and efforts that try to distort the free market mechanism.

Possibility: Long term: YES; Medium term: YES; Short term: NO

- Let the market forces of demand and supply determine its natural equilibrium price.

Possibility: Long term: YES; Medium term: YES; Short term: NO

- No administered price.

Possibility: Long term: YES; Medium term: YES; Short term: NO

Strategy to Eradicate & Control Inflation

6. BEHAVIOR

- Abstain from wasteful and luxurious living. Conduct modest way of live. Avoid consumerism and hedonism.

Possibility: Long term: YES; Medium term: YES; Short term: YES / NO

- Avoid spending future income for current consumption using various financial instruments, such as credit card, consumer loans, etc.

Possibility: Long term: YES; Medium term: YES; Short term: YES / NO

- Avoid speculation behavior in financial markets or real market.

Possibility: Long term: YES; Medium term: YES; Short term: YES / NO

Conclusions

- Inflation emerged as a transgression of Allah's law in the form of deliberate debasement of metallic currencies by the government which cause natural imbalance and catastrophe manifested in the form of hyperinflation (Egypt 14th century) and first two crises (UK 19th century). The transgression has been expanded and sophisticated by the adoption of fractional reserve banking, *riba* (interest), *mysir* (speculation), and *gharar* (unclear transaction).
- Inflation was formalized by the adoption of 'inflation economics' (beneficial inflation), modeled by John Maynard Keynes, by most world economies. So that, inflation is a matter of ideological and political choice of economic regime by the government.
- Empirical results show that if the main three conventional sources of inflation (excess money supply, interest, and exchange rate) were replaced by their Islamic counterparts (just money supply, PLS, and single global currency) , the rate of inflation drops significantly. It leaves to the government to make political will and commitment to eradicate and control inflation.

Recommendations

- **Under dual monetary system, inflation can be partly eradicated and partly controlled. The extension of eradication can go as far as Austrian school with the elimination of money and credit creations, as well as the restriction of speculative activities gradually and systematically. What essentially required is government will and commitment. Other inflation determinants that cannot be eliminated should be controlled tightly with discipline.**
- **Under dual monetary system, to minimize the negative impact of inflation can be done by increasing the share of PLS-based Islamic finance (banking, capital market, insurance, mutual funds, etc.) and adopting PLS returns as policy rate anchor as well as PLS-based monetary instruments, since PLS returns has smaller share to inflation.**
- **This study can be improved and extended by the selection of more proper proxies (especially for lnFM and lnIM), by applying alternative methods, and by comparing with other countries.**

Wallahu a'lam Bishawwab

Questions and Answers

CPI Inflation Conventional

❑ UNIT ROOT TEST

Variable	ADF Value		PP Value	
	Level	1st Difference	Level	1st Difference
lnINF	-2.017662	**-5.725297**	-2.126808	**-5.945859**
lnFM	**-4.824814**	**-11.78985**	**-4.923389**	**-11.89806**
lnFRB	-3.079985	**-8.913325**	-2.879012	**-10.90732**
INT	-2.471834	**-2.608266**	-1.842393	**-2.711992**
lnEXC	-3.286378	**-7.488670**	-3.361708	**-7.485727**
lnVF	-1.944728	**-6.153117**	-1.944728	**-6.258380**
lnADM	-1.727568	**-8.591592**	-1.740053	**-8.591592**
XINF	**-7.646497**	**-10.66152**	**-7.646497**	**-27.10121**

Bold: Significant at 5% (McKinnon)

- ❑ All variables are stationary at 1st difference I(1). **lnINF** CPI inflation, **lnFM** fiat money, **lnFRB** fractional reserve banking, **INT** interest rate, **lnEXC** exchange rate, **lnVF** volatile food, **lnADM** administered price, and **XINF** expected inflation.

CPI Inflation Conventional

❑ OPTIMUM LAG TEST

Lag	LogL	LR	FPE	AIC	SC	HQ
0	913.5364	NA	8.02E-22	-25.87247	-25.61550	-25.77040
1	1070.596	273.7318	5.68E-23	-28.53130	-26.21857	-27.61266
2	1271.465	304.1730	1.22E-24	-32.44185	**-28.07334***	**-30.70662***
3	1325.023	68.86118	1.97E-24	-32.14352	-25.71925	-29.59172
4	1386.436	64.92163	3.12E-24	-32.06959	-23.58955	-28.70122
5	1483.433	80.36954	2.49E-24	-33.01238	-22.47658	-28.82743
6	1626.885	86.07121*	9.54E-25*	-35.28244*	-22.69087	-30.28091

❑ **Using Schwartz Information Criterion, the optimum lag for the model is 2 (two).**

CPI Inflation Conventional

❑ COINTEGRATION TEST

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.776204	**254.1268**	**156.00**	168.36
At most 1 **	0.439774	**143.3473**	**124.24**	133.57
At most 2 *	0.404274	**100.4706**	**94.15**	103.18
At most 3	0.313595	62.14049	68.52	76.07
At most 4	0.215102	34.29522	47.21	54.46
At most 5	0.113435	16.37234	29.68	35.65
At most 6	0.095534	7.462662	15.41	20.04
At most 7	0.000436	0.032300	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 3 cointegrating equation(s) at the 5% level
Trace test indicates 2 cointegrating equation(s) at the 1% level

❑ **There exist 3 cointegrating equations.**

❑ **STABILITY TEST shows the equation is stable (modulus < 1) up to lag 6.**

Appendix

IRF Conventional

Response of LNINF to LNFM

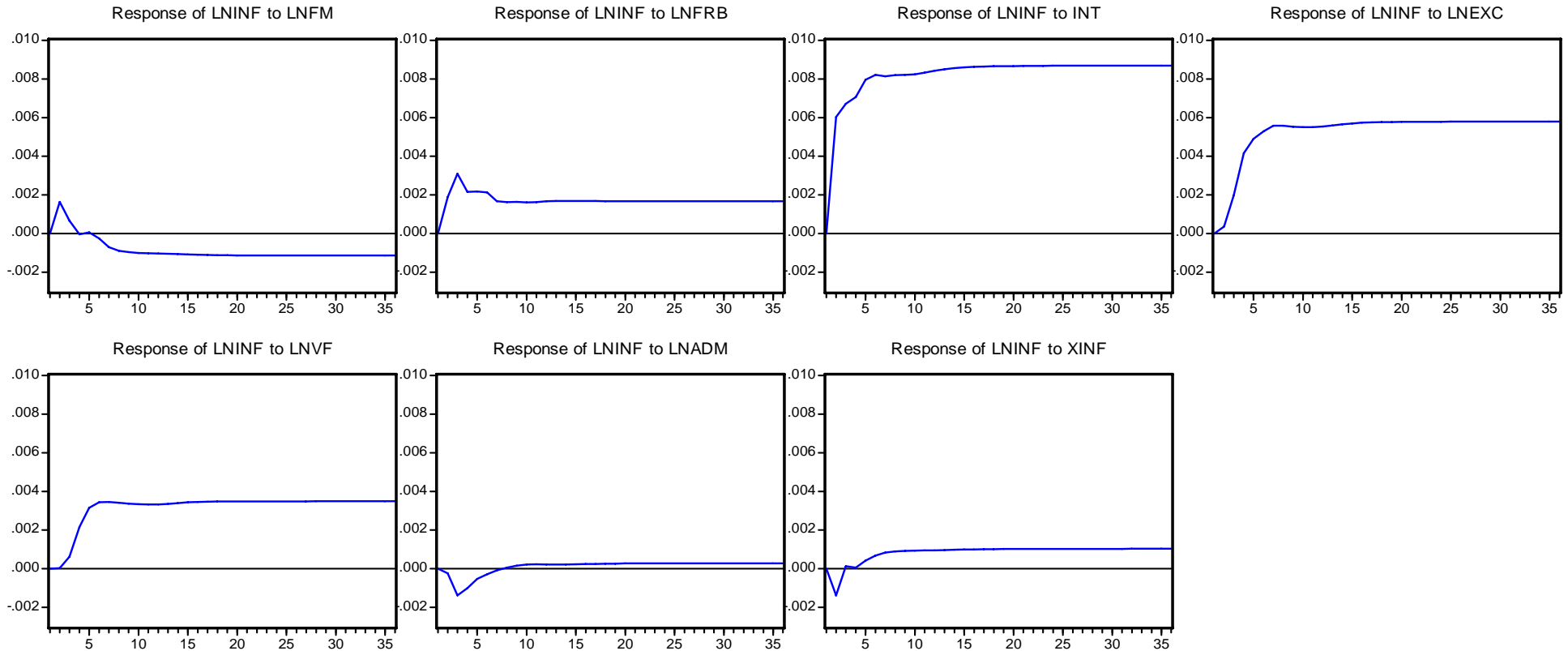
Response of LNINF to LNFRB

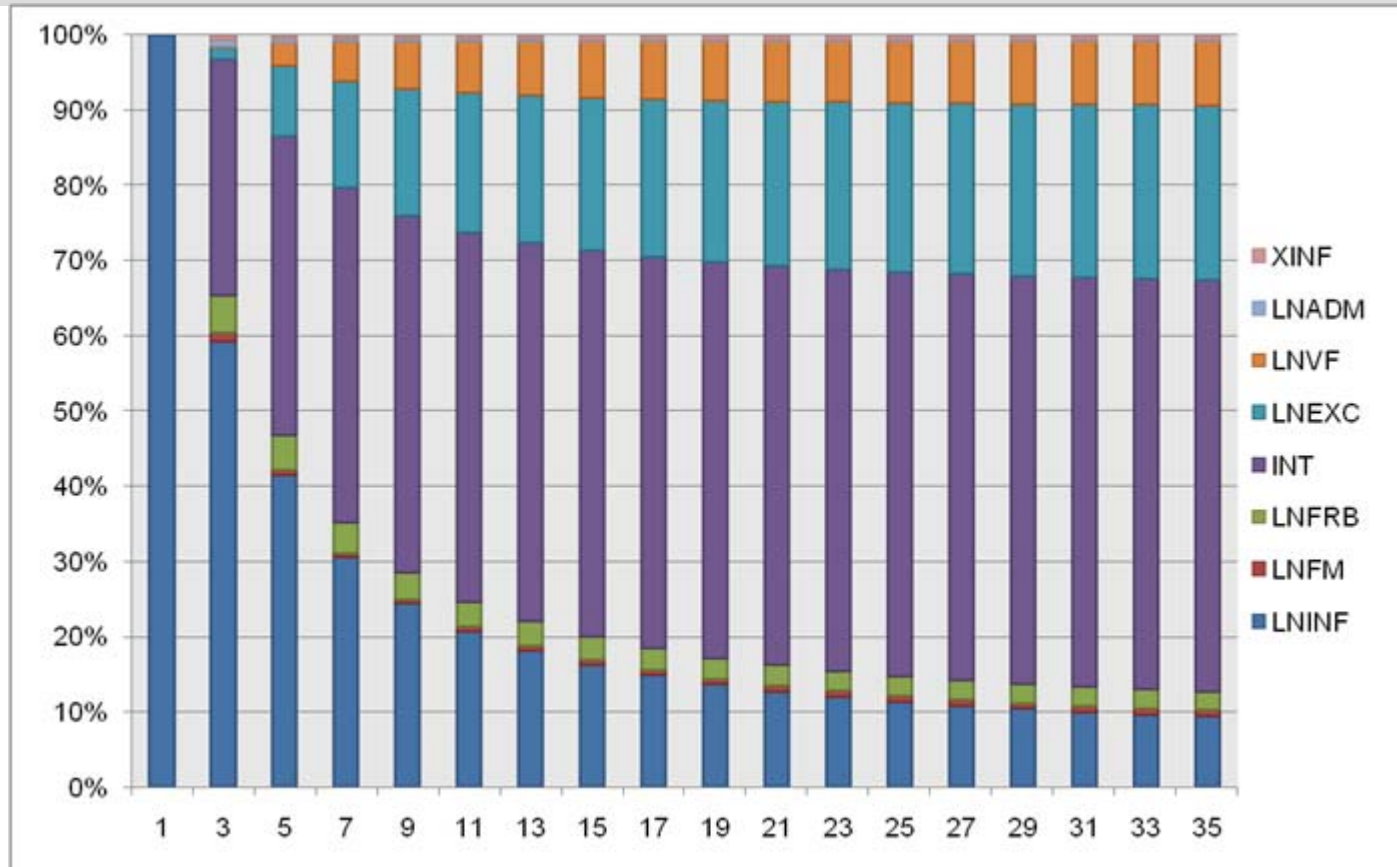
Response of LNINF to INT

Response of LNINF to LNEXC

Response of LNINF to LNVF

Response of LNINF to LNADM

Response of LNINF to XINF

- ❑ **INT and lnEXC give the biggest positive impact, followed by lnVF to inflation in Indonesia.**

FE VD Conventional

- Fiat money (lnFM 0.9%), fractional reserve banking (lnFRB 2.4%), interest (INT 54.7%), exchange rate (lnEXC 23.4%), volatile food (lnVF 8.5%), administered price (lnADM 0.1%), and expected inflation (XINF 0.7%) give 90.8% share to the behavior of CPI inflation. lnFM, lnFRB, INT, and lnEXC give 81.4% share.

CPI Inflation Islamic

❑ UNIT ROOT TEST

Variable	ADF Value		PP Value	
	Level	1st Difference	Level	1st Difference
LNINF	-2.017662	**-5.725297**	-2.126808	**-5.945859**
LNIM	-3.104865	**-9.137752**	-3.296647	**-9.137057**
RS	-1.723664	**-12.10274**	-2.170508	**-12.28582**
LNGOLD	-3.002142	**-8.001290**	-3.084710	**-8.030769**
LNVF	-1.944728	**-6.153117**	-1.944728	**-6.258380**
LNADM	-1.727568	**-8.591592**	-1.740053	**-8.591592**
XINF	**-7.646497**	**-10.66152**	**-7.646497**	**-27.10121**

Bold: Significant at 5% (McKinnon)

- ❑ All variables are stationary at 1st difference I(1). lnINF inflation, lnIM just money supply, RS PLS return, lnGOLD single global currency, lnVF volatile food, lnADM administered price , and XINF expected inflation.

CPI Inflation Islamic

❑ OPTIMUM LAG TEST

Lag	LogL	LR	FPE	AIC	SC	HQ
0	641.7224	NA	3.14E-17	-18.13492	-17.91008	-18.04561
1	719.7312	138.1871	1.38E-17	-18.96375	-17.16495	-18.24925
2	922.2814	318.2931	1.79E-19*	-23.35090	**-19.97815***	**-22.01120***
3	956.6064	47.07430	3.02E-19	-22.93161	-17.98492	-20.96673
4	992.2669	41.77375	5.50E-19	-22.55048	-16.02985	-19.96041
5	1056.045	61.95622	5.32E-19	-22.97273	-14.87814	-19.75746
6	1142.260	66.50823*	3.56E-19	-24.03599*	-14.36746	-20.19554

❑ **Using Schwartz Information Criterion, the optimum lag for the model is 2 (two).**

CPI Inflation Islamic

❑ COINTEGRATION TEST

Unrestricted Cointegration Rank Test

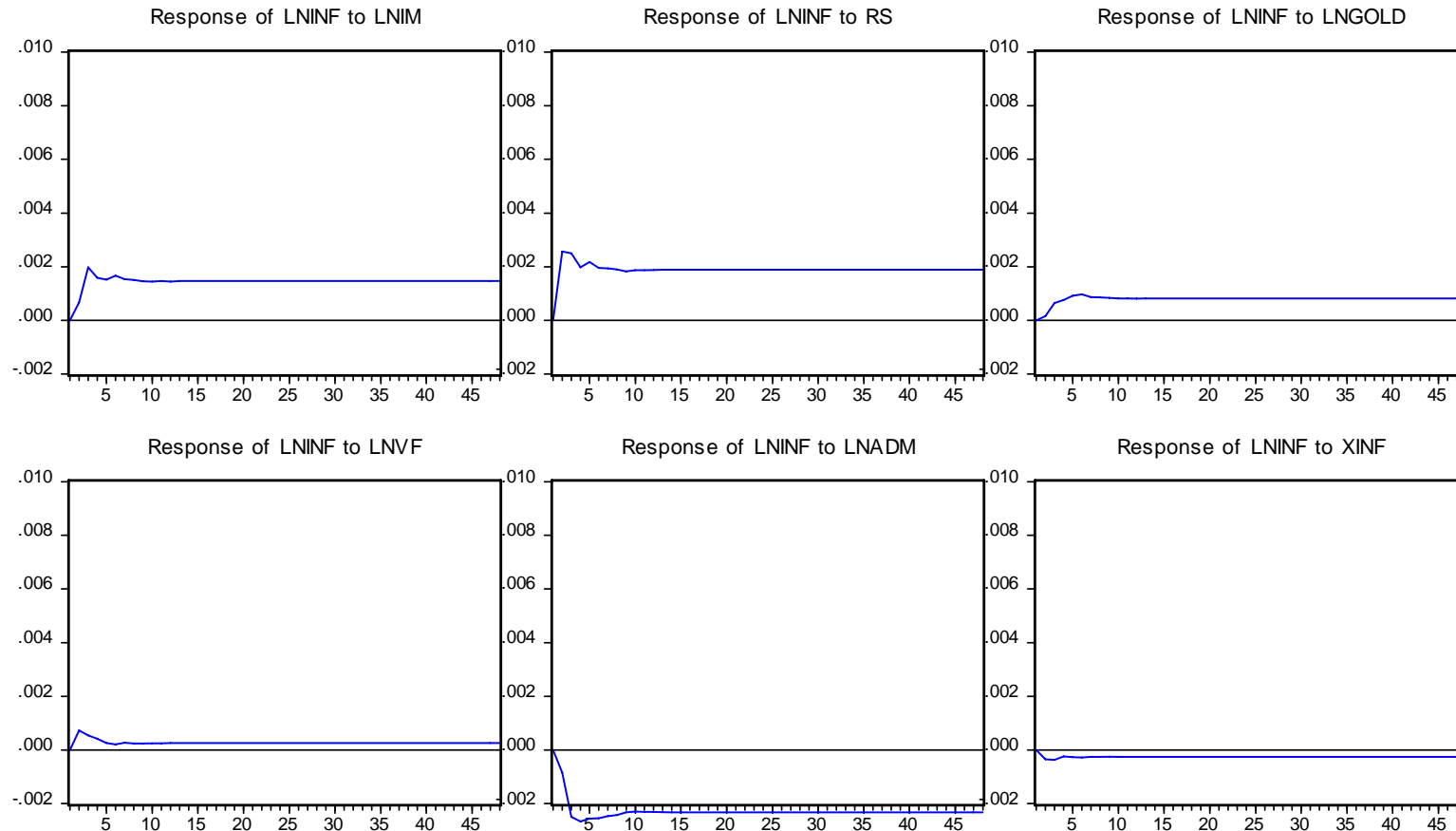
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.750291	193.5966	124.24	133.57
At most 1	0.386269	90.92458	94.15	103.18
At most 2	0.263822	54.79785	68.52	76.07
At most 3	0.201701	32.13284	47.21	54.46
At most 4	0.108911	15.46274	29.68	35.65
At most 5	0.089306	6.929729	15.41	20.04
At most 6	9.71E-05	0.007188	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level

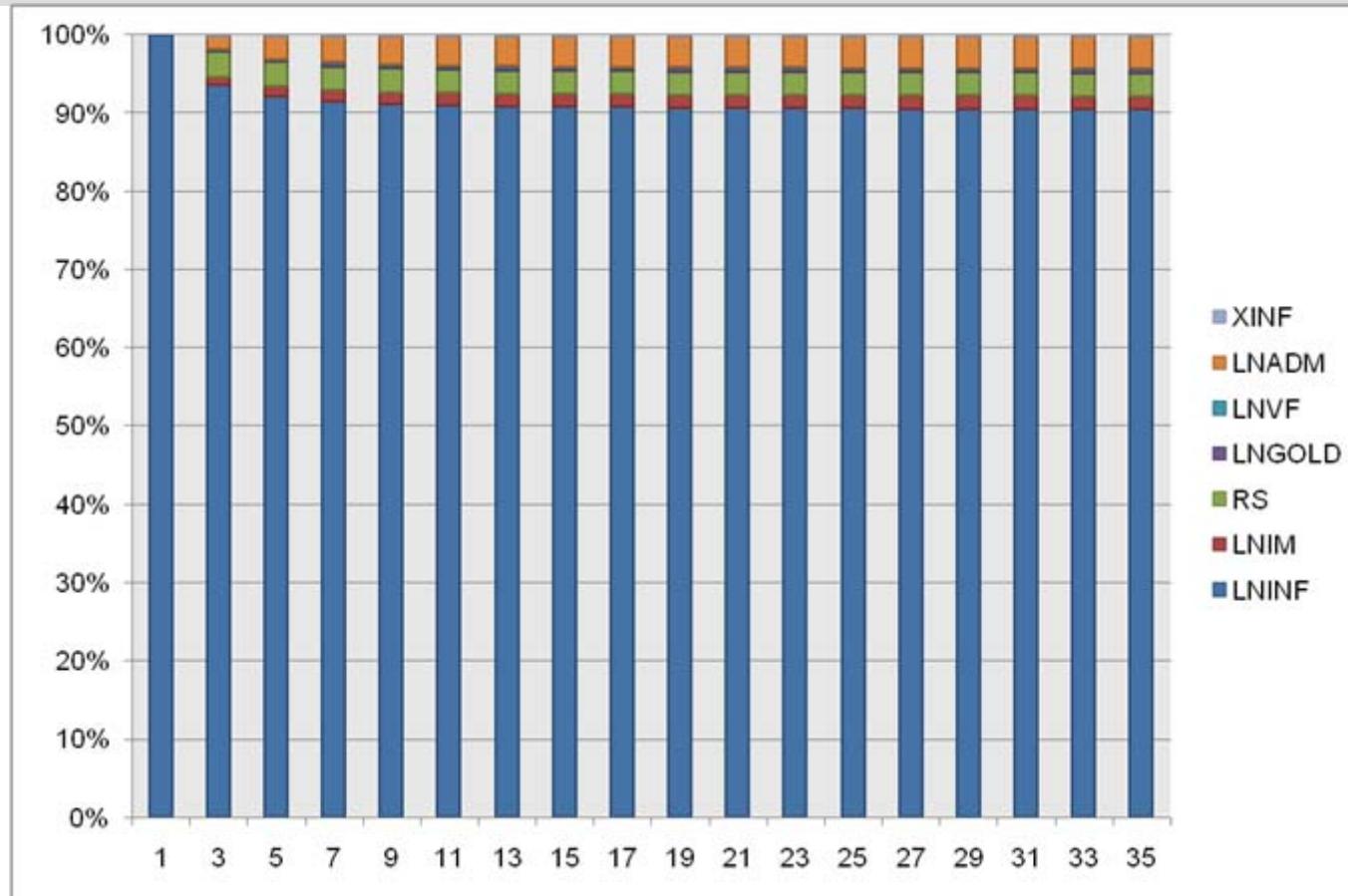
Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

- ❑ **There exist 1 cointegrating equation.**
- ❑ **STABILITY TEST shows the equation is stable (modulus < 1) up to lag 7.**

Appendix

IRF Islamic

- Only variables **lnIM** and **RS** give small positive impact to inflation in Indonesia, which is still significantly smaller than **INT** and **lnEXC**.

Appendix

FE VD Islamic

- Just money supply (lnIM 1.7%), PLS return (RS 2.9%), single global currency (lnGOLD 0.5%), volatile food (lnVF 0.07%), administered price (lnADM 4.3%), and expected inflation (XINF 0.05%) give 9.5% share to the behavior of CPI inflation. lnIM, RS, and lnGOLD give 5.1% share.